Metamorphic evolution and geochronology of gneisses from the Wanni Complex, Sri Lanka

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The Wanni Complex is found in the northwestern part of Sri Lanka. The boundary to the Highland complex occurring to the south is partly ill defined. Differences in isotopic model ages were used to separate both units (Kitano et al. 2018; Milisenda et al. 1994). While the Highland Complex has gained a lot of attention due to the UHT metamorphic overprint (up to 1150°C and 8-12kbar)(Sajeev and Osanai 2004) detailed petrological and geochronological work in the Wanni Complex is missing. Only a few studies focus on the border area between the Wanni Complex and the Highland Complex (Kitano et al. 2018; Wanniarachchi and Akasaka 2016).

Large areas of the Wanni Complex are covered by biotite gneisses, mostly migmatic, partly with occurrences of arrested charnockites or displaying potassium metasomatism (Cooray 1994; Kröner et al. 2003). However, charnockitic gneisses, garnet bearing gneisses and in the southwestern part cordierite bearing gneisses and metapelites occur which can be used for obtaining the PT history of this complex. PT conditions of the Wanni Complex obtained from garnet bearing rocks place the metamorphic overprint clearly into the granulite facies and partly into the UHT field. Compared to the Highland Complex, temperatures are somewhat lower at 800-1000°C at 7-9kbar.

LA-ICP-MS U/Pb dating was performed on zircons from different locations of the Wanni Complex and shows igneous protolith ages of 855-963Ma. The ages were obtained from felsic hornblende-biotite gneisses and charnockitic gneisses. The wide range of ages could be a result of resetting shortly after magmatic crystallisation. CL images of some zircons show dark zones separated from oscillatory zoned cores by thin bright fronts. Taken together with core/rim dating of these zircons, this could be a sign of transgressive recrystallization (Hoskin and Black 2000).


